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Cities Personal Foresights: A case study in Turin metropolitan area

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Turin's trajectory

Turin area in the past decades has driven several main structural changes, from the Fordist city (Bagnasco, 1986) and the Regulatory Plan of 1959, which had to deal with uppermost rate of immigration of any large Italian city, to the crisis of the heavy-industry with the relocation and internationalisation of manufactory. To steer from the possible decline to a new development, six main strategies were pursued.

First, the new Regulatory Plan of 1995 set a fresh regulatory and zoning framework for land use in the city. The Plan was redacted by Vittorio Gregotti and Augusto Cagnardi, worldwide renew urban designers, who developed it around a number of innovative and leading ideas.

Second, new functionalities and regeneration of the city 'by proxy', for promoting the numerous dismissed industrial areas to private developers, within clear defined guidelines towards mixed-settlements and land uses. Several dismissed industrial areas were along or adjacent to the city's main railway line, which runs North to South, at the time cutting across the city and generating main spatial separation, a barrier to the city as a whole. The two existing railway lines were doubled and trenched, fourfold increasing in its transportation capacity, transforming the surface into a 12 km long six-lane arterial road across central areas.

Third, this new axis constitutes the "Spines" of the new development of the city, connecting the centre to main large industrial complexes that have concluded their manufacturing cycle. These industrial complexes, which had contributed to the previous growth of manufacturing city, now are converted and reorganised. Especially four main industrial complexes along the length of this axe contribute to the creation of the "Spines", for over 2.1 million square-meters of land, instituting the principles for a multi-polar development of the metropolitan area. The destinations of these new poles were designated about half to residential use, the other half to green and to commercial and tertiary activities.

Fourth, Torino's first metro line, a fully automatic 15 km length route with 21 stations connecting from West to South the city.

Fifth, two Strategic Plans (1998-2010) drafted, for the first time in Italy, the strategic lines of development, defining the institutional framework for the active involvement of local governments, public and private sectors, and actors of the society.

Sixth, in this structure of initiatives sets the candidature plan of the city to host the 2006 Winter Olympic Games, which was awarded in 1999.

SimTorino 2030

The chapter introduces the development and on-going experimentation of an *active* and *dialogue* methodology to support the participation in the decision-making process oriented to the development of Turin Metropolitan area: *SimTorino 2030*. The project starts from a collaborative effort between the local Administrations that have the responsibility of the policies on the metropolitan area at different scales, municipal, provincial and regional, and the LAQ-TIP Laboratory of the Politecnico di Torino. The collaboration with the Lab is aimed to experiment in the specificity of the metropolitan area a methodology to orient and drive the development and the implementation of new project, plans, and policies.

Active

Active approach to the development of the metropolitan area is aimed to “overcome a regulatory framework, result of eighties’ orientation towards the need of containing the development” (Viano, 2008), in favour of an approach to create and foster opportunities, to bring out the actors and processes, engaging with the dynamics and where possible, anticipate future changes, to plan and share appropriate actions.

The two Strategic Plans of Turin “are ground breaking. They have built a sharing among economic and social actors on a diagnosis about the strengths and weaknesses of the territory (not just in the physical meaning, of course), and around the identification of strategic actions to address and redefine identity and vocation in relation to new framework, globalised and competitive, in which we operate.” (Viano, 2008).

An active orientation seeks creating advantageous conditions for future development of the metropolitan area, which directly concerns the availability of resources and the definition of the agenda for their uses. Both resources and agenda deal with changed and mutable context, driven by international economic competition, economic recession, and emerging of actors and processes. Consequently resources are increasingly related to the capability to involve public and private sectors. Specifically, the capability to renew the *North-East quadrant* of Turin relies on the interrelation of four combined action lines:

- (1) **improving public spaces**, non just architectonically, but economically and socially too, starting with funding from European and local projects;
- (2) the **reuse and requalification of the large dismissed industrial areas** between Turin and Settimo, summing up to about one million square meter, creating new polarities, whose construction is expected to produce the resources for the reorganisation of the mobility and transportation;
- (3) **new arterials and requalification of existing ones**, the *Spina* boulevard in extension to the number 11 national road, the *Green Ringroad*; the relevance of arterials as a connectivity tissue of the city, not just a means of transportation, but axes of valorisation and enhancement; the lesson taught by incremental growth management is to orient the generative properties of infrastructures towards urban design;
- (4) **public transportation and intermodal integration**, the new Metro Line 2, particularly the construction of new trunk between *Vanchiglia* depot and *Spina4* gives the opportunity to redesign the accessibility as well as reshaping and renewing the NE quadrant, especially the existing mixed land-use of commerce, services, workshops, and residences.

The active orientation requires the metropolis involving the resources from the market and directing them towards the actions. During the first half of the 20th century, the budget of Municipalities largely depended on incomes from taxes on the real estate. During the last decades, local governments are decreasing their financial backing, imposed by tight budget constraints (not only in Italy), and needs for capital improvements, while are promoting Public-Private Partnerships (PPP). This has required a paradigm shift in plans and policies, from legislation and financial incentives, towards the involvements of private sector and citizens, seeking equilibrium among social-, private- and personal-utilities.

Several cities are interpreting the *active approach*, constructing spatial plans as marketing tools: this is especially evident in Copenhagen, Lausanne, Milano, and Zürich cases. While, the active methodology being experimented for the Turin metro area is in the extent of the two Strategic Plans: a shift from the regulatory approach of the '80s and from the drive to a disjointed project-led incremental approach. An active approach is required to motivate and facilitate, rather than simply regulate, private or public projects. Moreover, the active framework has been experimented in the view of its capability to deal with broader environmental objectives and the architectural and social qualities of the metropolis as a strategic outlook to the coming and evolving challenges and opportunities.

Dialogue

SimTorino adopted a "dialogue model", that is "a complex model of interacting processes where the directives coming from the top are informed by the perceptions of problems, possible solutions, and situational constraints coming from below, and where these directives in turn structure perceptions and the search for solutions at the section level." (Mayntz, 2006)

The Organisation for Economic Co-operation and Development (OECD) has proposed a three-tier model of citizen relations in policy-making:

"Government-citizen relations cover a broad spectrum of interactions at each stage of the policy-making cycle: from policy design, through implementation to evaluation. In reviewing this complex relationship, the OECO survey used the following working definitions:

Information: a **one-way relation** in which government produces and delivers information for use by citizens. It covers both 'passive' access to information upon demand by citizens and 'active' measures by government to disseminate information to citizens.



Consultation: a **two-way relation** in which citizens provide feedback to government. It is based on the prior definition by government of the issue on which citizens' views are being sought and requires the provision of information.



Active participation: a **relation based on partnership** with government, in which citizens actively engage in the policy-making process. It acknowledges a role for citizens in proposing policy options and shaping the policy dialogue -- although the responsibility for the final decision or policy formulation rests with government.



Active participation and efforts to engage citizens in policy-making on a partnership basis are rare, undertaken **on a pilot basis only and confined to a very few OECD countries.**" (OECD, 2001)

SimTorino implements and experiments active engagement of the public, as participants in the planning- and the policy-making process, contributing with their considerable knowledge and valuable expertise. The purposes for seeking active participation can be organised around the steps of the process that several authors have contributed to well-define (Patton, forthcoming; Bardach, 2009; McRae, 1997; Bardach, 1996; Dunn 1994; Kweit, 1987). SimTorino has been structured along five tiers (Fig. 1):

1. Define the domain of the public participation,
2. Empowering stakeholders' knowledge,
3. Generate personal foresight,
4. Evaluate foresight, and
5. Map the knowledge.

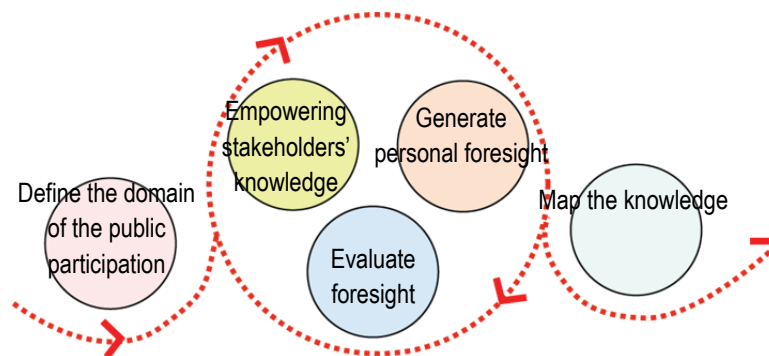


Figure 1. Five steps in the process of active participation

1. Define the domain of the public participation

It is often the case that the public do not have well-formed values and opinions on relatively new plans or policy topics, until there are involved in the public participation process (Reich, 1988).

SimTorino has contributed to clarify and to define the domain of the planning and policy discourse to the public participation. For the ease of understanding, the domain is structured as a taxonomy built on top of three abstract concepts which are pivotal in order to represent the three folds of the public process: *Issues*, *Goals*, and *Measures*. A *Goal* specifies the scope and the aim of the policy. For a given goal, the *Issue* identify the aspects that will be affected by the policy. Finally, *Measures* provide a full specification of how to comply with the given policy (Kunz, 1970).

SimTorino presents to the public each of the three abstract levels with multimedia narrative, combining text, pictures, and video clips. The perspective on issues, goals and measures of the plan or policy contributes to develop a common language and understanding. Without this common ground, as Parkinson (2006) notes, public participations are going to generate fuzzy and skewed results, because "the general public" are not so informed and the positions they take on plan or policy matters will be different as a consequence.

2. Empowering stakeholders' knowledge

The threefold structure canvasses the direct contribution of stakeholders, facilitating them with an intuitive cause-and-effect framework. In particular, citizens can contribute to a policy as “expert of their experiences” (Sleeswijk, 2005). Yanow (2003) defines the public insight in and contribution to policy options as *local knowledge*: “the very mundane, but still expert, understanding of and practical reasoning about local conditions derived from lived experience”.

Citizens, when given the opportunity “to consider a policy issue, can bring at least three perspectives to bear on the issue at the same time” (Maxwell, 2003):

1. citizens are likely to view an issue from the perspective of a taxpayer, who must pay for the cost of public policy decision;
2. as consumers or users of government services, they have expectations about the quality of service they want;
3. they are members of a community, local and national.

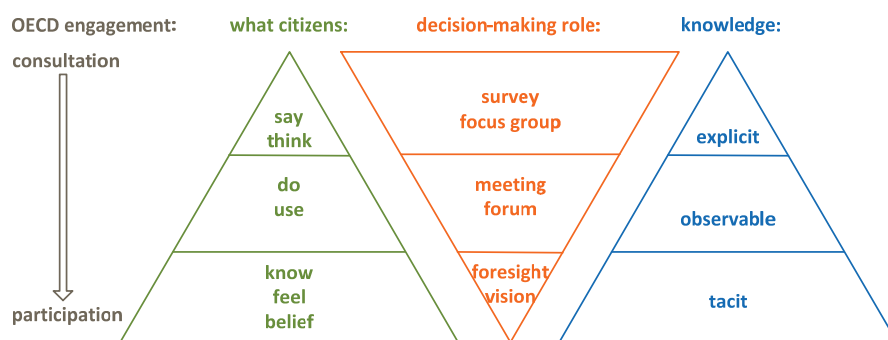


Figure 2. Engagement - Decision-making role - Knowledge

By bringing three perspectives to bear on issues, citizens as citizens can contribute with their knowledge and expertise to plan- and policy-making, reconciling conflicting values and proposing options consistent with their priorities, values, and community. In the threefold structure, the Issue aims to engage the stakeholders, having them contributing with their own *local knowledge*: “have engaged an issue, considered it from all sides, understood the choices it leads to, and accepted the consequences” (Yankelovich, 1991). Grounding on the epistemological definition of *local knowledge*, SimTorino has mapped the issues into the stakeholders' local and lived experience, building a *Citizen Folksonomy*.

SimTorino has requested the public to express their choices, needs, aspirations, and preferences on the four action lines (1-4). Each individual having interacted with SimTorino system has contributed to populate the *Citizen Folksonomy*. “Folksonomy (from folk and taxonomy) is a neologism for a practice of collaborative categorisation using freely chosen keywords. The idea of a folksonomy is to allow the users to describe a set of shared objects with a set of keywords of their own choice.” (Mika, 2007). Technically, the Citizen Folksonomy is implemented as a collaborative tagging system, where users are permitted to annotate (integrate) *Issues*, *Goals*, and *Measures*, with free-form strings of their choosing.

3. Generate personal foresights

SimTorino has presented to the citizen the vision of Turin in 2030, generated from her or his choices, needs, aspirations, and preferences on the four actions lines.

To generate the individual vision of the future SimTorino:

- 3.1. creates the *personal foresight*,

3.2. simulates the personal foresight, and

3.3. visualises the personal foresight.

3.1 *Create the personal foresight*

To create the *personal foresight*, which represents the stakeholder's "hypotheses of futures" (Ogilvy, 1998), SimTorino maps the individual's choices, needs, aspirations, and preferences on the four actions lines, from the Citizen Folksonomy into inputs to the simulation models.

The mapping attempts to make explicit the interrelated role of:

- Citizen Folksonomy, the structured and formal representation of the citizen's knowledge expressed as local knowledge on the plans and policies,
- Simulation Models on the metropolitan area, integrated land use, taxation, real estate, infrastructures, public and private transportation.

3.2 *Simulate the personal foresight*

The *Personal Foresight* gives the opportunity for the public to have direct input into simulations models and to get in output the foresight for the metropolitan area two decades ahead. The capacity for citizens to have direct access to simulation, through the Citizen Folksonomy, rather than through intermediary technicians, grounds on the evolution of micro-simulation.

SimTorino has implemented integrated micro-simulations to answer the demands of the stakeholders (the citizens especially) on the broad range of interrelated actions (1-4) for the North-East quadrant. This holds especially true for public insight in and contribution to plans and policies in land use, transportation, and environment, for the capacity of microsimulation in addressing those issues. As the success of metropolitan plans and policies depends on the contribution and coordination of micro-level and macroscopic organisations, we consider that detailed simulations are required. On one hand, this can make the models complex, but on the other, it enables them to serve very distinct and separate purposes in plan- and policy-making.

For SimTorino, OPUS/UrbanSim (Waddell, 2005) has been implemented for the metropolitan area, because the platform can simulate the interactions among 1) micro-level and macroscopic organisations, and 2) local and global drivers of the urban system.

3.2.1 *Micro-level and macroscopic organisations*

"In our individualistic societies, many questions are related to this interaction between microlevel and macroscopic organisations." (Pumain, 2006) The underlying paradigm of OPUS is that urban dynamics over time and space is the product of the choices and actions of individuals and organisations: households, businesses, developers, and government (Figure 3).

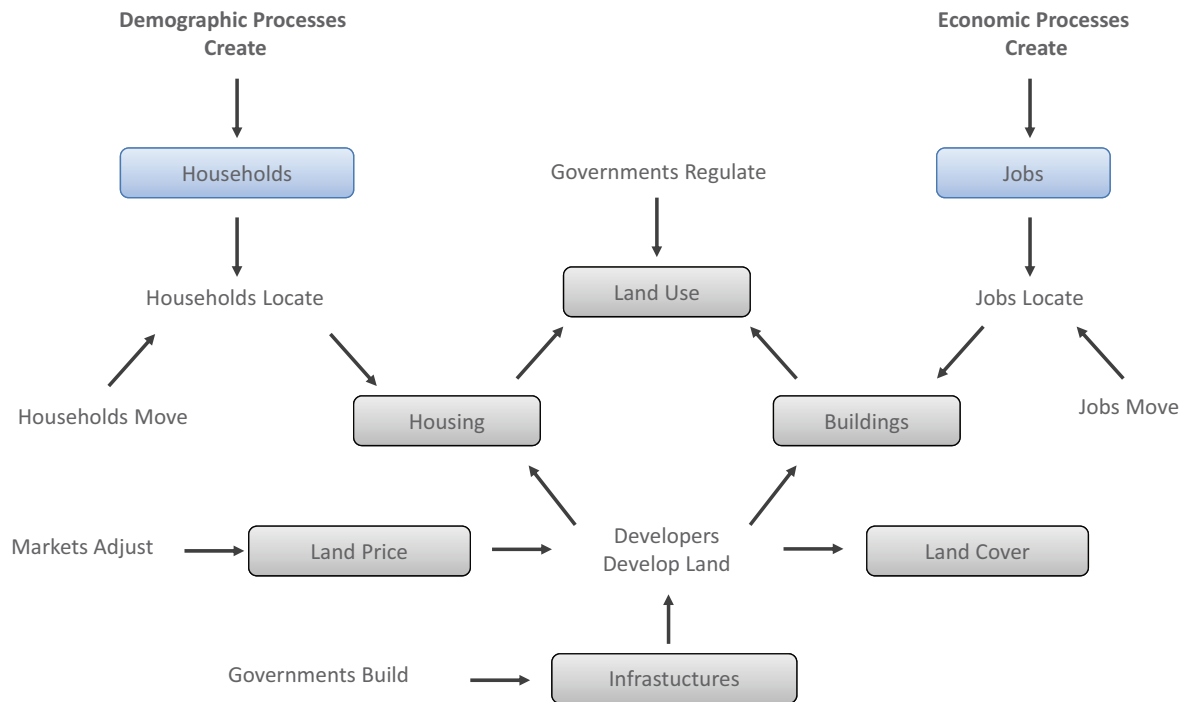


Figure 3. Linked choices and actions of individuals and organisations (after Waddell, 2004)

The noteworthy feature for the simulation of the Personal Foresight is the level of detail for disaggregation across individuals and organisations and for spatial disaggregation at the scale of plots and buildings. The high level of detail empowers the stakeholders' direct input into decision-making, because it re-joins the plans and policies to the local and daily impact on individual's and organisation's choices and actions.

3.2.2 Local and global drivers

The simulation is grounded in macro- and micro-economic, the considered discrete choices theories, which has provided the theoretical rationale, and the methodological rigor.

The different simulated actors make their location decisions within various markets, respectively real estate, labour, goods or services. The integrated simulation operates as a disequilibrium model in which stock supply and demand are built gradually over time. The demand for building stocks (respectively residential, industrial, commercial, and services) is based either on the willingness-to-pay or on the bids (i.e. observed prices, since often willingness to pay is difficult to measure in practice). Figure 3 outlines the links within markets and actors: the developers invest in plots to be constructed or refurbished that are demanded by households and businesses, who are also interacting in the labour, the goods and services markets. On one side, government actors provide infrastructure and services, on the other regulate the land use and the infrastructures, e.g. the considered *Urban3* and the requalification projects of the large dismissed industrial areas between Turin and Settimo, new arterials and the new Metro line. Further, the citizen defined *Personal Foresight* can be based on varying levels of detail that implicitly include land-use and growth plans/policies, such as destinations, mixed densities, green areas, environmental options, or a range of needs and preferences on infrastructures and transportation.

SimTorino individually simulates each of the 638,785 family units, the 658,110 workers and the 107,338 buildings which, since the initial year of 2001, are to be found in the 34 Municipalities of the Turin metropolitan area (Figure 4).



Figure 4. The thirty-four Municipalities of Turin metropolitan area

At the metropolitan scale, SimTorino models the changes of the land use dynamically, where households' and businesses' price and accessibility demand functions are estimated. Unbiased parameters are set for the large number of alternative choices by a random sample of the alternatives, because the actors are both not perfectly mobile and aware of the market alternatives, to take advantage of available opportunities. A leading aspect is that location choice and urban development are distinguished, as is the supply side of the real estate market.

The four major drivers of the urban model are demographics, the metropolitan economic makeup and level of activity, government plans and policies (e.g. regulation, zoning, taxation), and the infrastructure system. Each drive involves a set of interacting models:

- *Activity-Based Travel model,*
- *Demographic and Economic Transition models,*
- *Household Mobility and Location models,*
- *Business Mobility and Location models,*
- *Real Estate Development and Land Price models.*

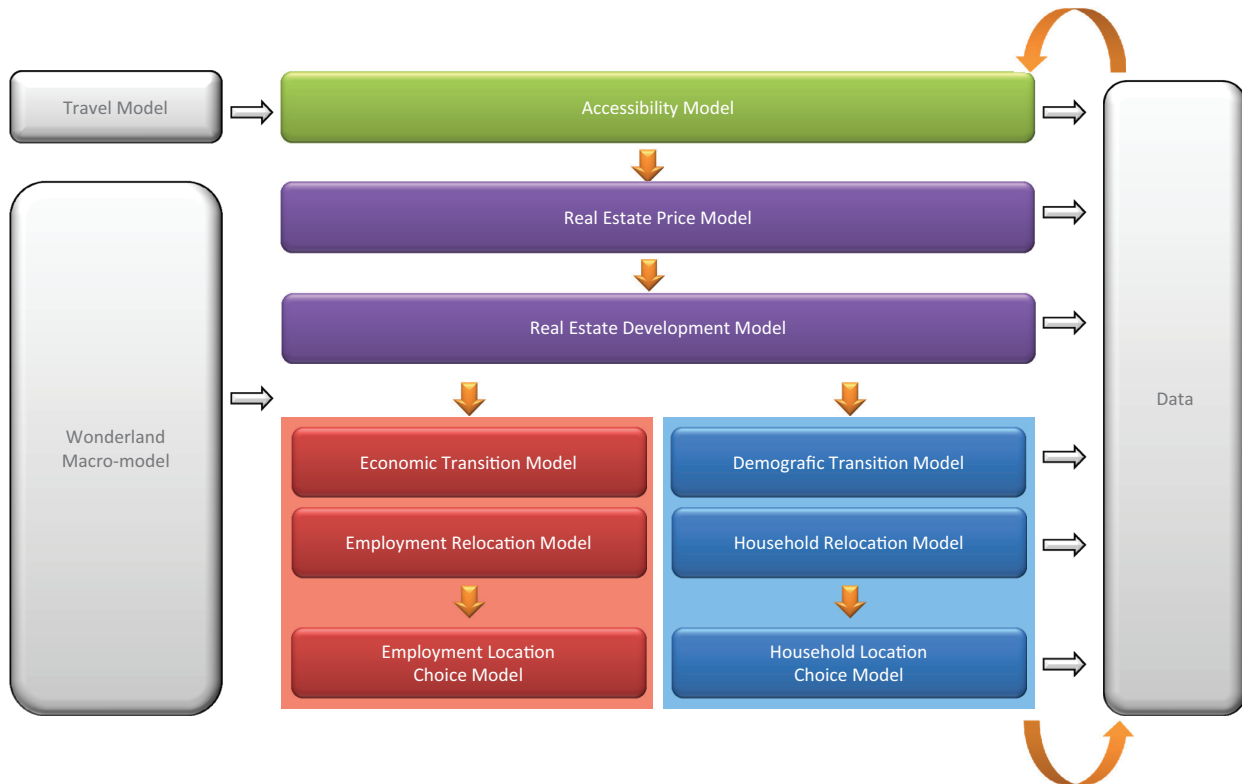


Figure 5. Structure of the models.

At the *national and global scales*, SimTorino models the impact of over local factors that influence metropolitan dynamics, so as urban consumption and production, by land and transport market outcomes. If the Personal Foresight has to foresee two decades of the metropolitan area, it has to consider “the broader environment within which that system is embedded. What possible futures of that wider world could impact the planned system significantly” (Couclelis, 2005).

Globalisation with the internationalisation and relocation of the manufacturing plants and the increasing competition at national, European and international scales, the economic and environmental crises, European strategies and the federalist government (Jouve, 2005; Pinson, 2005), all contribute to macro dynamics that, while it is outside the control of metropolitan actors, has a deep and long-term impact on local scenarios and strategies.

SimTorino has implemented *Wonderland*, originally conceived by Warren C. Sanderson (1994) at the International Institute for Applied Systems Analysis. *Wonderland* represents straightforward interrelations among economy, demography, environment and interactions.

3.3 Visualise the personal foresight

SimTorino has integrated morphological and analytical representations to foresight the consequences of different policy options on the metropolitan area. Together, these tools visualise the output from the simulated personal foresight to prefigure what present and future impacts of the policies could be in the citizens' place of interest (Fig. 1).

The output of the microsimulation is processed into morphological and analytical representations, accessed from a web page combining geo-web and geo-visual analytics windows. This web page is customised and unique, as the output from the microsimulation are the results of the citizen's input, as defined in the Personal Foresight.

3.3.1 Morphological representation

The fine level of detail of the Personal Foresight and of the microsimulation, that is the spatial disaggregation at the scale of plots and buildings, are processed into a three dimensional representation of the metropolitan area at 2030.

The approach of SimTorino relies on defining a number of reference typologies that, at large, can match the destinations from the microsimulation. Every type has at least two degrees of freedom: the density and the shape in the plot. Furthermore, rarely in the Turin case, a plot arranges just one typology, more often several different ones coexist. The shape and layout of the typologies within a plot, interconnected by infrastructures and public, semi-private or private spaces, rely on explicit and implicit knowledge.

SimTorino has developed the research on neighbourhood and district design, to represent explicit and implicit knowledge and to implement a multi-agent based methodology to generate the 3D morphologies (Caneparo, 2008). The morphologies are generated as interaction between the design knowledge representation and the interactive generative system that interprets this knowledge. For a given plot, the system generates the layout and the morphology/ies matching the output from the simulation (destinations and densities) with the appropriate design knowledge, assigning each input and knowledge unit as task to software agent. The space of the morphologies for the plot is generated by interacting agents in the multi-agent model implemented in Java, as a multi-level integration of schedules, in which the generation can indeed be considered as a nested hierarchy of models, in which the schedules of each agent are merged into the schedule of next higher level.

In SimTorino the generative procedure creates: 1) realistic 3D representations of buildings and infrastructures, these are effective and engaging visualisations for the citizens; 2) symbolic 3D representations of either the built environment (Figure 6). The high level of detail of both realistic and symbolic 3D models empowers the stakeholders' direct input into decision-making, because it re-joins the plans and policies to the local and daily impact on individual's and organisation's choices and actions.

The models can be exported in various formats, including Google Earth and Microsoft Bing Maps, for stakeholders' direct navigation in and interaction with.



Figure 6. Realistic and symbolic representations

3.3.2 Analytical Representations

Decision-making processes ground on set of highly complex and interacting layers that contribute to form the opinion on urban or regional dimensions (e.g. geographic, administrative, demographic, economic, etc.). Usually it is quite difficult for the stakeholders to build a rationale or even just a sight on these “hidden” layers. Especially of factors that, despite of their eluded consideration in the dialogue, are crucial to urban quality and daily life, such as public space, built environment, social and functional mixité, and accessibility: these are invisible yet powerful drives, contributing to shape the city.

Microsimulation can provide considerable data on the next decades of Torino, including socio-political aspects, such as the dynamics of real estate development, density destinations, building envelopes. Further ones are quantitative information on air quality, commuting time and means, all elements that can positively contribute to inform decisions on policies, plans, and projects.

SimTorino implements analytical representations to visualise and interact with multi-dimensional geospatial data by means of Parallel Coordinate Plot (PCP). Parallel coordinate was originally defined by Inselberg (1985) for visualising high-dimensional geometries in two-dimensions. After Wegman (1990), the leading idea of the PCP is to assign each data field to an axis. Several axes can be placed side by side: the number is constrained just by the size and resolution of the screen, thus representing various different fields simultaneously. Each data in a field corresponds to a point on the respective axis.

3.3.3 4D Interaction

Morphological and analytical representations are coupled: selecting a data field in one view, highlights the corresponding representation in the other view. This is a particularly clear means of communication for the geo-visualisations, since the stakeholders can build their understanding of interdependencies, of relationships among planning, design or policy choices and options. The representation of the simulated personal foresight in its geographical context is underpinned by the concept of spatial dependence, which assists the stakeholders in interpreting and understanding the individual vision augmented through the “first law of geography”, also known as Tobler’s first law: “everything is related to everything else, but near things are more related than distant things” (Tobler, 1970).

Personal foresights explicitly deals with the time dimension of a policy for a place, thus many of their properties are not solely for geography but common for geography and time. Morphological and analytical representations are interrelated on the time axis too, and benefit from visualisation and interaction in Google Earth 4D (space + time). 4D Personal Foresights allows the public to interactively explore the dynamic of the metropolitan area, defining the interrelations between place, time, and built environment. The user’s SimTorino can animate the dynamics of the metropolitan area, to understand where, when, and how her/his 2030 Personal Foresight has been evolving.

Since “a picture is worth a thousand words”, the interaction with morphological and analytical representations is much more intuitive than its description: in Google Earth selecting individuals or groups of 3D objects highlights in PCP the associated data fields and the connecting trajectories (sequences of polylines connecting data). And vice versa: selecting several values or polylines (records) in the analytical representation, highlights the pertaining morphology/ies in Google Earth (Figure 7).

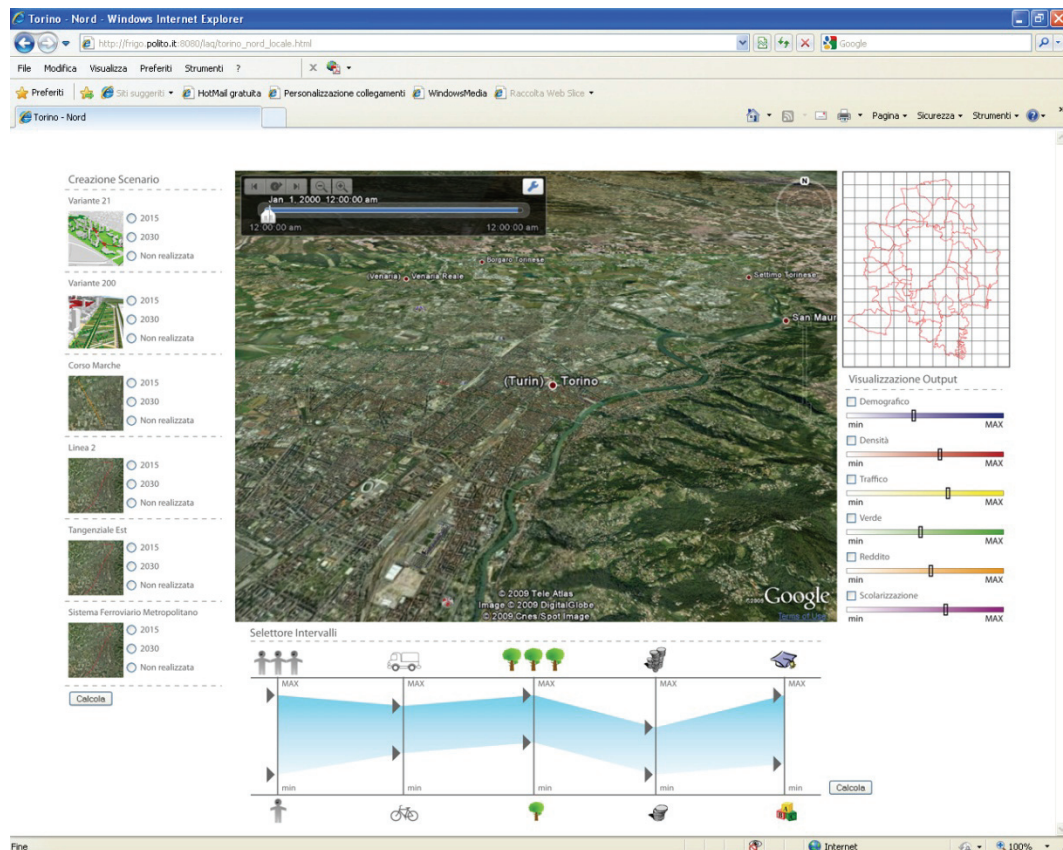


Figure 7. SimTorino the web page for the 4D interaction with morphological and analytical representations

4. Evaluate personal foresight

Visualising the foresight for the places defined by the stakeholders, SimTorino has focused the attention of the stakeholders on the outcomes. This fosters decision-making effectiveness, since public consultations often get stuck in positional conflict about “what” (are we for or against a policy?), while SimTorino advances open consideration of “what/how” (what happens if? and if not? who is damaged? are there possible compensations or alternatives?).

SimTorino empowers the stakeholder in expressing the desirable and undesirable aspects of the personally defined vision of the future. They are invited to express their opinions on general and specific aspects. The thousands of feedbacks, expressed by the citizens, have considered a wide range of instances; we propose to classify them into three main categories:

- input to the four action lines, as options, choices or proposals;
- place-based expectations or requirements, especially raised by or related to spaces, buildings or infrastructures, as emerging from the morphological and analytical representations;
- actions, sometimes pertaining to the actuation of project/plan/policy in their time-space dimensions.

Figure 8 ranks the thousands of desirable and undesirable options and expectations, expressed by the users of SimTorino. The rank derives from the number of occurrences of the same or similar issues. Despite a certain degree of uncertainty exists in the process of automatically assigning an aspect to a category (and in defining the categories), particularly for the ones with multiple options and/or proposals in the same sentence.

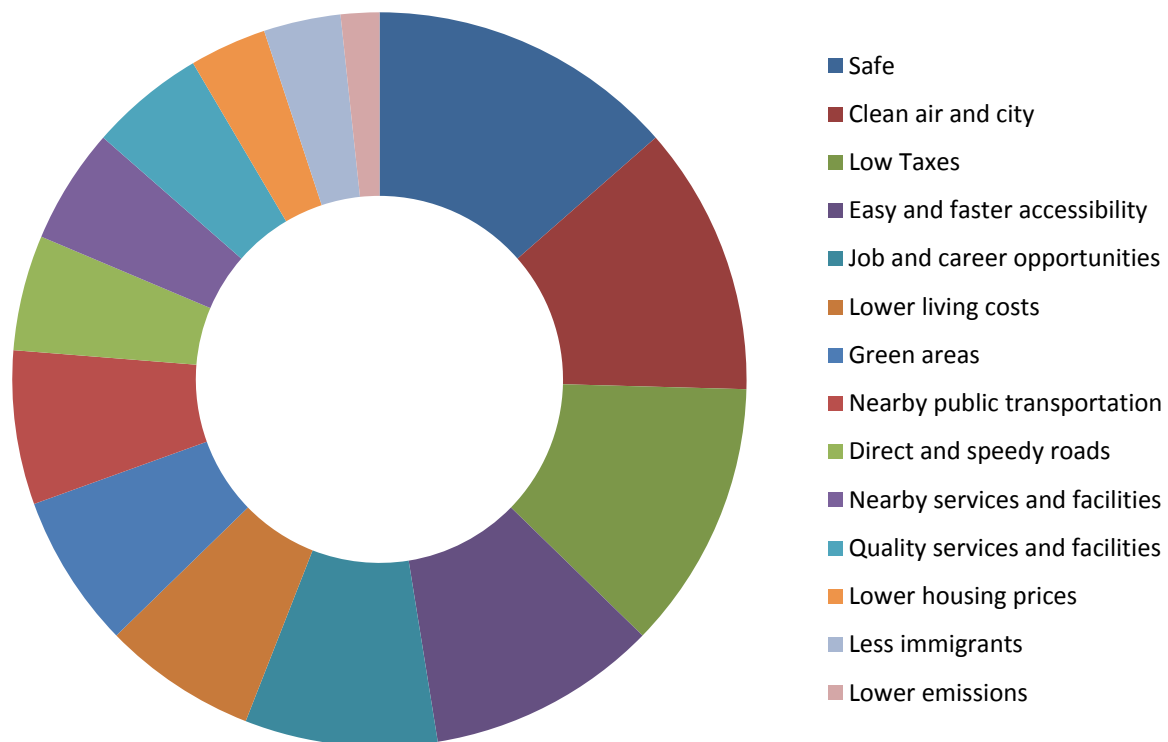


Figure 8. Rank of the options and the expectations expressed by the users' SimTorino

Central to the evaluation process is the concept that planning-policy pathways to the future can be achieved by a diverse range of options, and these pathways should be not just feasible, but socially participated too. Among other issues, SimTorino facilitates the social exploration of the question *“What are the ways in which we could act in order to reach a particular planning issue or goal?”*

SimTorino has aimed to set up a partnership between citizens and government, based on active contribution to policy as local knowledge: “the very mundane, but still expert, understanding of and practical reasoning about local conditions derived from lived experience” (Yanow, 2003). The Citizen Folksonomy embodies the citizens’ proposals in policy options: each individual contribution participates to the policymaking process.

An aim of SimTorino is to give the citizens the effective opportunity to direct propose options to government. Whereas in decision-making process organised groups gain their role in terms of their capability to mobilise resources to present and support a position: “They are there to represent a particular interest (neighbourhood, ethnic group, religion, age-group, etc.) rather than to contribute their local knowledge” (Barnes, 2007), their focused activism has demonstrated significant constraints in terms of canvassing a range of suitable policy options. SimTorino has empowered the direct involvement of citizens in developing and contributing policy options, the local knowledge, which has potential of innovation for the interaction of citizens with the government, because “citizens as citizens are often better placed to reconcile a range of perspectives on a given issue” (ibid).

Collectively, the individual contributions shape the policy dialogue: the means is mapping the knowledge.

5. Map the knowledge

According to OECD (2001) “the responsibility for the final decision or policy formulation rests with government.” The aim of mapping the knowledge is not just to elicit contextual information, but also to bring it to policymakers in a form that

serves the making of stakeholders-centred plans, projects and policies. In SimTorino the knowledge is goal-oriented and embodies personal sights. SimTorino has implemented and experimented a knowledge-mapping methodology to share the local knowledge, expressed in a tacit way from the citizens and stakeholders, mapped to the decision-makers graphically.

The graphic representation is based on hyperedges maps (Mika, 2007), which highlight the commitments of the stakeholders in terms of goals and issues, and their object, represented in the Folksonomy with ternary associations between the *user* (stakeholder), the *concept* and the *object*.

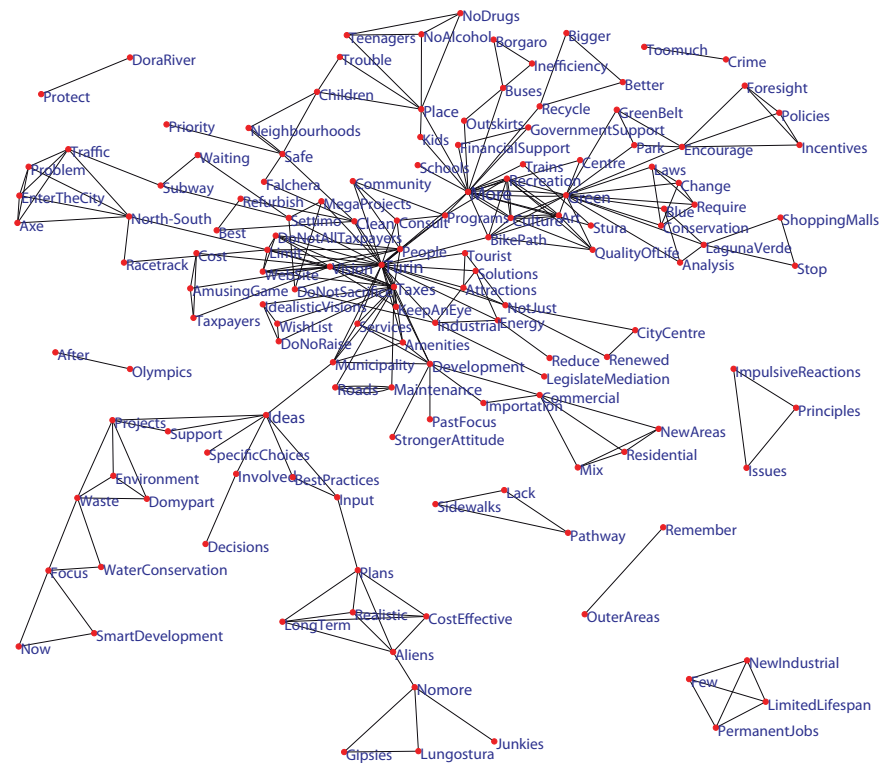


Figure 9. Hyperedges map of concepts expressed by the users' SimTorino before filtering.

SimTorino advances interactive view and zoom to hyperedges maps to highlight three association networks, respectively:

- the occurrence of the goals and issues, by offering search and navigation based on decision-makers' broader or narrower definition of the issues,
- the explicit mapping of the social context, associated to issues, emerging as relationships among the stakeholders, structuring them in communities pursuing similar interests in terms of explicit goal and place,
- the issues are linked to the stakeholders representing the topology of the relationships. The topological representation illustrates the degree of stakeholders' engagement and the extent of their contributions to the plan or project. A further analysis of the typology is expected to provide insights on social engagement in and contribution to the decision-making process.

Interactive knowledge mapping to the decision-makers should be understood as an “atlas”, indicating ways, expectations, and options on the plans and projects, not as a mere normative, prescriptive commitment to any fixed solution. Mapping the knowledge is a rather different perspective on the objectives and methodologies of participatory

modes of governance: it stresses not the efficacy of exposing citizens to expert knowledge; instead it exposes experts to what has been referred to as lay or personal knowledge.

Concluding Remarks

SimTorino, listening to citizens' preferences and expectations, has provided to a broad public the opportunity to contribute to the four action lines, to assess what are preferred options in personal foresights, and has provided feedback through evaluation and measurement. It is likely to all help ensure that the public to be more supportive of the development and implementation of the considered policies, and to make projects and plans more effective and legitimate, and to build more trust in the policy and in the government. SimTorino provides evidence that when people are actively involved, they can help to generate a heightened sense of public value.

Efficacy

Increasing on-line engagement of citizens raises the question of the efficacy of the citizens' participation in policy process and extensively of citizens' interaction with the government. The question of effectiveness is multi-sided in that it is possible to assess the achievements of SimTorino (analogously to any on-line participation system) in terms of the degree to which procedural planning or policy goals will be achieved (such as engaging a broad cross-section of the public in the process) and the degree to which projects or practices will be influenced and motivated by the engagement of citizens through ICT tools.

In the end, a question that SimTorino case study was dealing with is: how the technology brought innovation in the process, yielding development and implementation of project, plans or policies have achieved their goals.

Trust

We consider that the sixteen thousand users' SimTorino, generating about 2.5 personal foresights each, have developed some understanding of the actions for the North-East quadrant, and could have strengthened the trust in participation in decision-making. Russell Hardin in *The Public Trust* (2000) considers "In conceptual work on the subject, it is commonly assumed that trust has two quite distinct dimensions: competence to perform what one is trusted to do and motivation to perform." In SimTorino competence has been both the one of the government and of the public: they are just flip-sides of the same coin. The first was top-down to represent the different folds of the decision-making process. The second was bottom-up, populated by citizens with concepts, contributions, and options on the action lines. What have been understood as local knowledge contributes both to motivate the citizens in participating and to shape their perspective role on issues, for example from the view of the taxpayers, from the users of government services, and from the members of a community.

This is especially true for the citizens that have a low ability to envision a future, any future, different from what they already know in their daily experience, primarily for the weakest social voices, often due to material or cultural poverty, which leaves few resources for and narrows the horizon of the expectations and the ambitions. In contrast, the action lines have been designed and communicated in ways and in forms to introduce visible and recognisable elements of innovation to the foresights.

Indeed, to the core of public motivation is the perception that citizens' efforts and contributions are producing measurable feedback in the decision process and do not occur only when it is convenient and instrumental to a larger political agenda.

Through citizens' engagement processes, SimTorino has demonstrated the capacity to build relationships of trust with the government and with the public. The experimented five-tiers of active participation (Define the domain of the public participation, Empowering stakeholders' knowledge, Generate personal foresight, Evaluate foresight, and Map the knowledge) for individuals or groups with different and even conflicting interest has focused their attention on the outcomes of the four action lines outlined. Parties who have disagreed have come to understand why the others hold a different position and to circumscribe the shapes of the reciprocal interests and of the juxtaposed issues, contributing to build a (well-)defined ground for a dialogue.

Quality

A term of the active dialogue has been the quality of the life and of the environment. These are elusive concepts that, possibly for this reason, are usually kept apart from urban governance processes. SimTorino has invested a big deal of effort on morphological and analytical representations, integrated within the five-tiers of the active participatory model. The system and its experimentation have aimed to explore the morphological aspects of the spatial construction of scenarios, and to place them at the beginning of the process, contextually to policy and government processes. We esteem this an added value of the case study, both for the methodology and for the impact on the decision-making process. Methodologically, for the shift from images of the city, intended as intentional construction of individual or group visible intentionalities, towards foresights as knowledge: "knowledge relating to specific histories of cities progressively accumulates, appears ever more as a great rhetorical figure - something on the edge, an unattainable point of escape." (Secchi, 2002)

The Turin case has placed morphology at the centre of urban transformation process: the foresights can become shared objectives and subjects of discussion also because they are 'forms', in other words figurations of constructed landscapes (Figure 6). In most cases the morphology is almost eluded or made aseptic by the infinite distance set apart by maps, while SimTorino has assigned a primary role to the three- and four-dimensional foresights of the metropolitan city: no longer representation, coming after political, technical and economic decisions, oriented by the demands imposed by the market, by initiatives, by communication, which threaten to reduce the design into a sequence of objects, eliminating the complexities of the relationships with the local or urban environment.

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